

Memo:

To: G. L. Finfinger, Research Supervisor, GMC  
Through: A. T. Iannacchione, Group Supervisor, GMC  
From: A. A. Campoli, Mining Engineer

Subject: Visit to Maple Meadow Mine, Fairdale, WV

The Maple Meadow Mine mines the Beckley Coalbed with six continuous miner sections. The mine produced a 1.3 million clean tons, reject from run of mine averages 35 percent, in 1992 with a total of 330 people. The mine became the property of Cyprus after the recent merger with AMAX.

A lost time bump accident occurred in the Maple Meadow Mine in late October. A roof bolter received a fractured leg when struck by a roadway roof timber thrown in a pillar bump. The attached memorandum from the Pittsburgh Safety and Health Technology Center to MSHA Coal Mine Safety District 4 describes the circumstances surrounding the bump and the mining layout changes eventually prescribed by the District Manager.

I visited the Maple Meadow Mine on December 2, 1993 in the company of District 4 Roof Support Specialists Charles Cline and Jon Braenovich. After an underground tour of the section I gave a presentation on Bump Control to 15 mine supervisors, including Charles Green, General Superintendent and Roger Lafferty, Underground Superintendent.

The Beckley Coalbed is not generally considered to be especially bump prone. The nominally 6 ft thick coalbed is generally overlain by laminated siltstones and sandstones that break easily at the pillar line. The bump events in the 2167 Section were caused by a combination of the highest overburden depths on the property, poor mine layout, and unusually high strength immediate roof. The overburden at the bump accident site was greater than 1,100 ft. The section formed a seven pillar wide finger surrounded by gob on three sides. The actual pillar dimensions were 55 by 70 ft with the long axis parallel to the gob expansion. The immediate roof near the bump site produced a Coal Mine Roof Rating of 72, two other areas of the mine produced ratings of 46 and 52. Mine personnel reported that the immediate roof was unusually strong in the bump accident area.

The Maple Meadow Mine is a candidate for Geologic Information System analysis. A bump hazard projection map could be produced from available geological information, with concentration on overburden thickness, strength of immediate roof, and coalbed thickness. An opportunity exists to develop a Cooperative Agreement with Cyprus to perform such an analysis.

Alan A. Campoli

Attachment  
CC:  
Zelanko  
Sames

U.S. Department of Labor

Mine Safety and Health Administration  
Pittsburgh Safety & Health Technology Center  
P.O. Box 18233  
Pittsburgh, PA 15236



Roof Control Division

November 10, 1993

MEMORANDUM FOR L. D. PHILLIPS

District Manager

Coal Mine Safety and Health, District 4

THROUGH:

ROBERT G. PELUSO *R. Day*

Chief, Pittsburgh Safety and Health Technology Center

FROM:

M. TERRY HOCH *Signed M. TERRY HOCH*  
Chief, Roof Control Division

MICHAEL A. EVANTO *M. A. E.*  
Geologist, Roof Control Division

SUBJECT:

Investigation of Ground Conditions at the Maple Meadow Mining Company, Maple Meadow Mine  
MSHA ID No. 46-03374

As requested, an investigation was made at the Maple Meadow Mining Company, Maple Meadow Mine on November 5, 1993. The mine has recently experienced coal bursts in the 2167 retreat section.

General Information

The Maple Meadow Mine is located near the town of Fairdale, Raleigh County, West Virginia. The mine is currently extracting the Beckley coal seam, which averages about 72 inches in thickness throughout the 2167 section. Total cover over the 2167 section ranges from approximately 700 ft. to a little less than 1200 ft. The immediate roof in the 2167 section is comprised of 3 ft. to 5 ft. of dark gray fossilized laminated shale. A significant sandstone unit overlies the shale and its thickness varies from 10 ft. to more than 35 ft. This sandstone unit has undulated into the coal seam creating "want" areas which are located sporadically throughout the mine. The bottom, as recorded in the three core logs supplied by the mine, consists of a thin layer of fireclay approximately 4 in. thick. A sandy shale unit underlies the fireclay with the thickness varying from 5 ft. to 15 ft. In two of the three core logs, a thin coal seam less than an inch thick was recorded between the fireclay and the sandy shale.

The 2167 section was developed as a five-entry system approximately 3700 ft. in length. Entry and crosscut widths vary from 18 ft. to 20 ft. The entries were developed on 75-ft. centers and the crosscuts on 90-ft. centers. A 200-ft.-wide barrier remained between the number 1 entry of the 2167 section and the previously pillared sections located to the left or southeast of the 2167 section. A barrier of varying width was located to the right or northwest of the 2167 section. Once the 2167 section was developed, a four-entry system was developed to the right or northwest and retreated to the number 5 entry of the 2167 section. The barrier to the left or southeast is then roomed for three blocks and six blocks are retreated across the new width of the 2167 section. The last pillar created by rooming southeast and a half block left in the previously pillared sections southeast or left of the barrier is not retreated for ventilation purposes.

#### Preliminary Meeting

Prior to going underground, a brief meeting was held at the Maple Meadow Mine office to discuss current conditions and mining practices at the mine. In addition to the authors, those present included:

|                  |                            |
|------------------|----------------------------|
| Gary Taylor      | MSHA District 4            |
| Herbert McKinney | MSHA District 4            |
| Jon Braenovich   | MSHA District 4            |
| Dan Bowles       | Company Safety Director    |
| Randle Thomas    | UMWA Safety Committee      |
| Roger Lafferty   | Underground Superintendent |
| Frank Rutherford | Mine Foreman               |
| Charles Green    | General Superintendent     |
| David Prelaz     | Chief Engineer             |
| Joseph Smith     | Company Safety Inspector   |
| Mike Williams    | UMWA Safety Committee      |

A complete mine map and topographic overlay maps, 2167 section maps as well as core log data was requested by the authors and supplied by company officials. The 2167 section was identified as the area where the coal bursts had occurred.

#### Underground Observation

Conditions were examined throughout the face area of the 2167 retreat section (Figure 1). Pillars numbered 84, 78, 79 are shown as completely mined; pillar 80 was split in the crosscut direction with the inby half mined and the outby half still intact. Pillar 81 was split in the entry direction with twinning proceeding left one cut. On development, roof support was provided with 5-ft.-long fully grouted bolts installed on 4-ft. by 4-ft. centers. During retreat mining, roof support is

provided with 4-ft.-long mechanical bolts on 4-ft. by 4-ft. centers in the cuts completed as the pillars are retreated.

Pillar sloughing was extreme for three blocks outby the face area with numerous posts set as supplemental support. Generally roof conditions appeared stable except for the crosscut between pillars numbered 91, 92, 93 and pillars numbered 98, 99, 100 where numerous cribs had been set and appeared to be taking weight. Bottom heave was evident in most of the crosscuts within three blocks of the face. The crosscut outby pillars numbered 80, 81, 82 had to be graded for clearance before retreat mining in this area. Observations inby the number 80 and 81 pillars revealed no caving of the roof and that numerous stumps and posts were still intact. Observations inby the number 97 and 104 pillars revealed that caving of the roof appeared to have fallen only approximately 10 ft. high. The rib of the number 89 pillar facing the 88 pillar and the right outby corner of the 82 pillar showed evidence of bursting. The coal in these areas of the pillars was dislodged 3-ft. to 5-ft. and appeared crumbled and highly fractured. Conditions improved significantly three blocks outby the face as was evident by the lack of sloughing of the ribs and the lack of weight on the occasional post or crib.

#### Subsequent Meeting

Following the underground investigation, a meeting was held in the mine office to discuss the findings. Those present were the same as during the preliminary meeting.

Based on the observations made, the following preliminary conclusions were drawn:

- o The retreat mining of the 2167 section surrounded by gob on three sides greatly increases pressures in the immediate face area.
- o The deep cover (approaching 1200 ft. after later examinations of topographic overlays of the mine) just outby the immediate face area increases the vertical stress and adds increased pressure in the face area.
- o Increased pressure is also being applied to the face region due to the practice of leaving portions of pillars in the adjacent gobbed areas.

The combination of conclusions stated above coupled with the stiff nature of the roof and floor and the strong character of the coal seam allowed pressure and thus energy to be stored in the coal pillars until failure in the form of bursting was and is probable.

### Recommendations

Based on in-mine observations and cover determination, the following recommendations are made:

- o Mining of the barrier to the left of the number 1 entry of the 2167 section should be minimized. Mining only for the purpose of connecting ventilation is advised.
- o Mining to the right of the number 5 entry with the proposed system (four entries developed and then retreated back to the number 5 entry), coupled with the first recommendation of not mining the barrier to the left would still create a situation with gob on two sides of the active pillar line in the 2167 section. It is recommended that a mining plan be created and implemented whereby only one gob exists during retreat mining in the 2167 section.

A preliminary ARMPS analysis (Analysis of Retreat Mining Pillar Stability) was completed and indicated a zone of complete pillar yielding extending three crosscuts outby the face. That analysis was based on an assumed in situ coal strength of 900 psi and did not match observed conditions. Depending on actual coal strength at the Maple Meadow Mine, the analysis suggested the potential for adverse bursting conditions to exist even with gob on two sides of the active pillar line.

If you have any questions concerning the evaluation or if we can be of further assistance to you, please contact Terry Hoch at (412) 892-6904 or Mike Evanto (412) 892-6917.

### Attachments

cc: Gary Taylor  
M. Evanto  
RCD Files



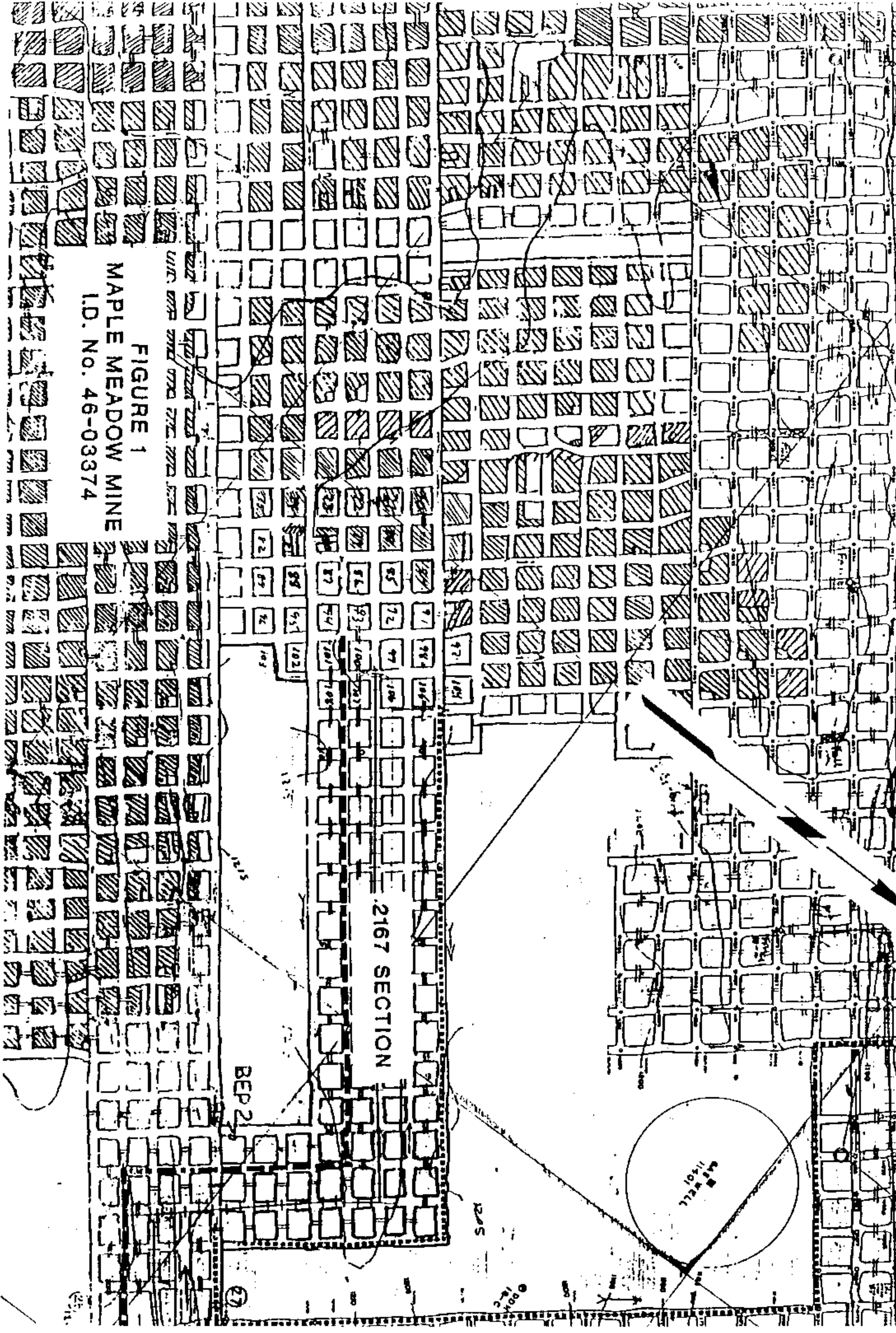


FIGURE 1  
MAPLE MEADOW MINE  
I.D. No. 46-03374

2167 SECTION

447 WELL

BEP 2